The Search for Crisis Alpha: Weathering the Storm Using Relative Momentum

February 2015

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Abstract

Tactical strategies are becoming more prevalent in the marketplace, especially for downside protection. While many of these strategies "go-to-cash" for protection during times of market turmoil, a number of asset classes and strategies, such as long volatility assets, managed futures, equity exposure management, and low volatility equities, have been able to deliver *crisis alpha* – strong performance over a risk-free asset during market crises – allowing investors to increase returns despite broad market losses.

In this paper, we introduce an easily accessible strategy, using relative momentum on U.S. Treasury investments (constant maturity indices and liquid, low-cost ETFs), to increase crisis alpha in a portfolio. We demonstrate over the period from 1962-2014 that the tactical methodology added significant crisis alpha relative to static fixed income investments (i.e. each individual asset and an equal weight portfolio). Next, we analyze the strategy separately over periods of rising and falling interest rates. We then utilize this strategy as the "safety asset" in a popular tactical investment strategy to increase both absolute and risk adjusted returns versus simply going to cash.

Finally, we look at a current investable version of the strategy using liquid fixed income ETFs and discuss some practical aspects of the implementation and possible improvements to the methodology.

Introduction: What is *Crisis Alpha?*

During market crises, investments often become highly correlated, a phenomenon that spans geographic regions (Kolanovic 2011) and asset classes (Sandoval 2011). This increased similarity wreaks havoc on many investors' portfolios and leaves managers with few options for safety at a time when they need it most.

Certain asset classes and strategies have historically outperformed the equity market during times of crisis. *Crisis alpha* refers to the excess returns generated by these assets during these tumultuous times. Benson et. al. (2012) examined a slate of these possibilities including cash, long volatility strategies, low volatility equities, trend following with managed futures, and equity exposure management through the use of protective put options and tactical investing. Greyserman and Kaminski (2014) thoroughly explore and evaluate the crisis alpha from trend following over a period reaching back to the Middle Ages.

Broadly, there are two approaches that managers can take to capture crisis alpha: they can maintain static allocations to documented sources of crisis alpha, or they can tactically overweight these sources during times of market crisis.

Benson et. al. (2012) take the first approach: they calculate the reduction in tail risk for a given allocation to each hedging strategy. This method can neutralize much of the tail risk, which they define as the expected return of the portfolio conditional on the S&P 500 losing more than 5% in one month:

$$Tail\ Risk\ = E[R_{portfolio}|R_{S\&P\ 500} < -5\%]$$

However, one may sacrifice an increasing amount of upside participation as the allocation to the hedge grows. For an extreme example, a portfolio with a 100% cash hedge has virtually no tail risk but also has negligible growth potential.

The static portfolio approach is very prevalent if we consider that fixed income has been a great tail risk hedge. Traditionally, low-risk fixed income investments, such as U.S. Treasuries, have been strong performers during times of crisis because of their safe haven status. Over the past 20 years, the correlation of 10-year U.S. Treasuries with the S&P 500 Index was -0.21, which represented a great diversification opportunity.[1] But with interest rates at historical lows, much of the previous benefit of holding a static fixed income sleeve, as in a typical 60/40 portfolio, may not be realized going forward.

Another approach is to tactically overweight crisis alpha generators when the perceived risk of a market crisis is elevated. This methodology has

[1] Under the two crisis measures defined in subsequent sections, the correlation of 10-year U.S. Treasuries with the S&P 500 Index was -0.03 (Measure 1) and -0.17 (Measure 2) during crisis months and 0.18 and 0.17 during non-crisis months.

gained significant traction in recent years, especially after the global financial crisis. “Go-to-cash” strategies aim to reduce portfolio risk when the broad equity market is at an increased risk of loss.

In this paper, we outline a methodology using relative momentum in U.S. Treasuries to increase portfolio crisis alpha. This focus is primarily motivated by two factors:

1. The safe-haven status of U.S. Treasuries has persisted throughout a variety of market cycles regardless of the interest rate environment.
2. A static allocation to any given U.S. Treasury maturity may underperform investments in other maturities depending on the specific rate environment (e.g. inverted yield curve).

The proposed method can be used in conjunction with a broad array of tactical investment strategies as an alternative to holding cash in during market crises.

First, we will look into the definition of a market crisis and the historical case for relative momentum using constant maturity fixed income indices. Next, we will develop the Crisis Enhanced Momentum strategy and examine sensitivities to the interest rate environment and the model parameters. Then, we will look at the performance of our strategy in the context of a tactical model case study. Finally, we will move to an investable universe of fixed

income ETFs and discuss some of the practical aspects of implementing the strategy.

Data

In this study, we examine the concept of crisis alpha using indices and then look at an implementable version using ETFs. Data for the S&P 500 index and the S&P 500 ETF (SPY) were obtained from Yahoo! Finance.

We construct constant maturity indices using the method of Damodaran[2] using 1-year, 3-year, 5-year, 7-year, 10-year, and 20-year constant maturity U.S. Treasury yields (daily data) from the U.S. Federal Reserve website. Each month, one period of coupon is rolled forward and the bond is then repriced using the new market rate. From January 1987 to September 1993, the 20-year bond did not trade. During this period, the 10-year rate was used as a proxy to interpolate the 20-year rate. All constant maturity indices begin in 1962, when the data were available from the U.S. Treasury.[3] The table below lists the fixed income ETFs used in this study.

[2] A spreadsheet showing the calculations can be found at http://people.stern.nyu.edu/adamodar/

[3] The one exception is the 7-year U.S. Treasury constant maturity index, which starts in 1969 when that rate became available.

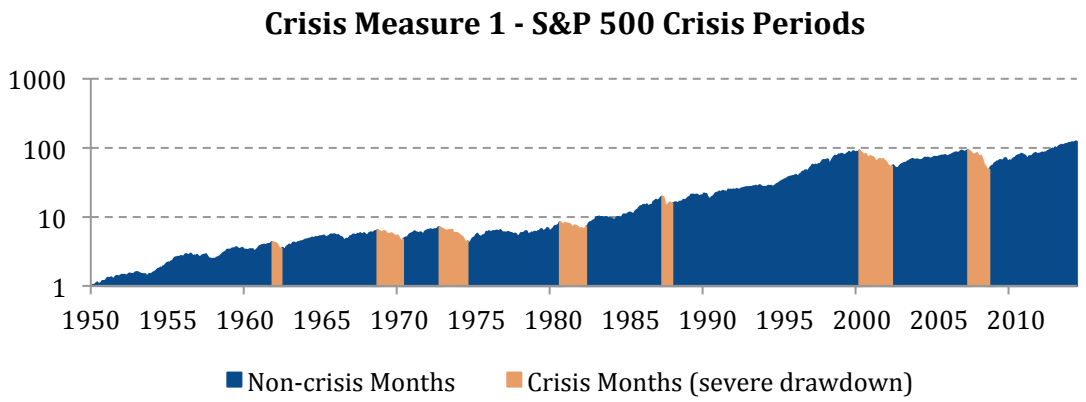
ETF	Description
SHY	iShares 1-3 Year U.S. Treasury ETF
IEI	iShares 3-5 Year U.S. Treasury ETF
IEF	iShares 7-10 Year U.S. Treasury ETF
TLH	iShares 10-20 Year U.S. Treasury ETF
TLT	iShares 20+ U.S. Treasury ETF

All ETF returns are total returns that include ETF expense ratios and the reinvestment of dividends. No fees were subtracted from any index.

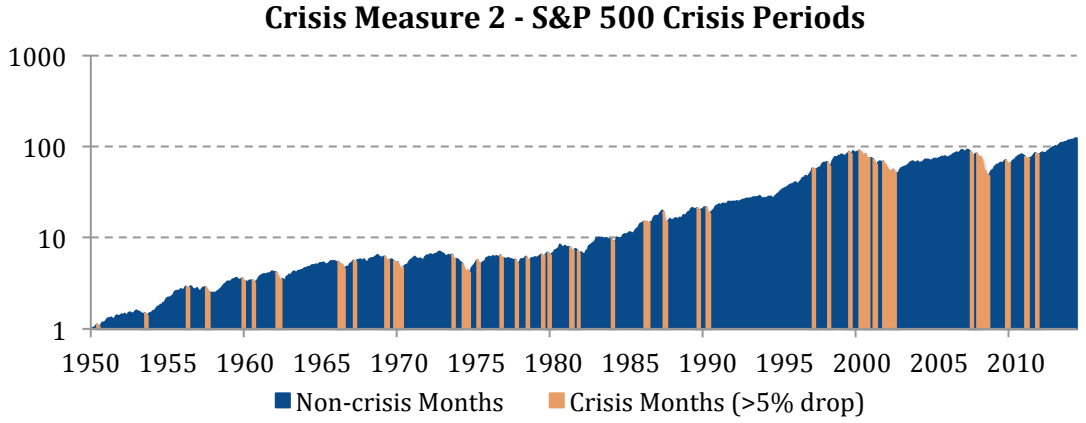
Defining a Crisis

The definition of "crisis" is somewhat subjective; different investors have different thresholds before a loss seems like a crisis. Patel and Sarkar (1998) define a crisis in developed markets as a period during which equities experienced a drawdown of greater than 20% with the crisis period beginning from the most recent market peak. This is a purely ex-post measure as it requires us to see the drawdown before determining that certain months prior to it were "crisis months".

In their paper, the crisis periods extend until the market has reached its previous peak (i.e. the market recovery is included in the crisis period). For the purposes of our current study, we will terminate the crisis period at the trough of the market during each crisis. The chart below shows the months identified using this method:



Another way of defining a crisis could be months where losses exceed a certain threshold. This method can also only denote crises after the fact; however, it acts on a shorter timeframe than the previous, drawdown-based method. In a vein similar to Benson et. al. (2012), we will take the monthly loss threshold as 5%. The graph below shows the crisis periods using this method.



In summary, the two measures of market crises are:

- Crisis Measure 1 – Severe and possibly prolonged drawdowns. Periods of slightly improved performance may be included in the crisis.

- Crisis Measure 2 – Sharp monthly declines. No periods of improvement are included in the crisis.

While these two methods identify different crisis periods – there is only a 24% overlap – both measures will be used to assess the performance of the strategy during short and long-term tail-risk events.

Constructing the Crisis Portfolio

U.S. Treasuries are often viewed as safe assets in times of market crisis due to their low credit risk and high liquidity.[4] This increased demand drives up the prices of treasuries even as equity prices may plummet.

Asness (2013) showed that the momentum anomaly, which was shown to exist in equities by Jagadeesh and Titman (1993), also applies to government bonds. Durham (2013) focused on relative momentum across specific duration buckets (i.e. maturities) along the yield curve. Based on these facts, we utilize relative momentum across the U.S. Treasury spectrum to construct a Crisis Enhanced Momentum portfolio.

Measuring Absolute Momentum

For inclusion in the portfolio, we first look at the absolute momentum of each constant maturity fixed-income asset under consideration. As in Durham

[4] This search for liquidity is somewhat similar to a bank run. See Diamond and Dybvig (1983).

(2013), we center our momentum search around 9 months (and later examine the sensitivity of this parameter). In general, interest rates are mean reverting.[5] While we do not make any assertion as to the relevance of mean-reversion affects on the time scales in the study, we default to the standard practice in determining momentum by neglecting the previous month's return, as was done for government bonds in Asness (2013). Including this month in the momentum metric improved the results across the board. Therefore, our results presented here are likely conservative.

To calculate the excess return of each asset, we utilize the return of 1-year Treasuries rather than using a more standard risk-free rate (e.g. 3-month Treasury Bills) because 1-year Treasuries are the most conservative investment option. Any asset exhibiting positive momentum is included in the portfolio. If no assets are exhibiting positive momentum, the full weight is given to the most conservative asset (e.g. 1-year U.S. Treasuries or the ETF SHY in a subsequent section).

Measuring Relative Momentum

Now that we have a measure of absolute momentum, we must determine how to gauge the relative momentum of the assets and weight them

[5] Many interest rate models such as the Vasicek model and Cox-Ross-Ingersoll model include a mean reversion parameter.

accordingly within the crisis portfolio.[6] A variety of weighting schemes could be posited. However, to avoid the likelihood of data snooping and an overfit model, we will rely on previous research and intuitive approaches as much as possible.

Assuming zero credit risk and liquidity risk, price changes in these constant maturity fixed-income assets are driven by duration, which generally increases as the maturity increases.[7] As such, some account of volatility in the weighting is reasonable to distinguish between a 1% increase in a short-dated bond versus a similar increase in a long-dated bond. The former would generally be viewed as a more significant price change.

Another consideration is risk aversion, especially since this is a crisis portfolio. Regardless of baseline risk aversion, the typical investor's risk aversion generally increases during market crises.[8]

Given these facts, a natural choice for weighting is to use a method along the lines of mean variance optimization (MVO), which accounts for return, risk, and risk aversion. Under the traditional, unconstrained mean-variance

[6] The simplest weighting scheme using momentum is to ignore any differences in relative momentum and simply hold all assets that are exhibiting positive absolute momentum. This portfolio will be included in the analysis for comparison.
[7] The relationship between maturity and duration will generally only be violated when the yield curve is very steep or if the yield and the coupon rate diverge significantly, which is rare in a constant maturity index because the bonds are rolled over at par.
[8] See, for example, Cohn et. al. (2014).

optimization setup, assuming uncorrelated assets, weights are proportional to the excess return, μ, divided by the variance, σ^2 (Grinold and Kahn, 1999):[9]

$$w \propto \frac{\mu}{\sigma^2}$$

Since we are dealing with correlated assets and desire a long-only, fully invested portfolio, a truly Sharpe optimal solution would require an optimization and a specification of the risk aversion parameter. To reduce the impact of estimation error that is characteristic in unconstrained and constrained MVO (Lederman et. al. 1994), we focus on relative momentum using the ranks of the assets as opposed to the specific values of the risk-adjusted return. Assets within the crisis portfolio are rank-weighted based on their risk-adjusted excess returns, where variance is used as the measure of risk. The following table presents an example:

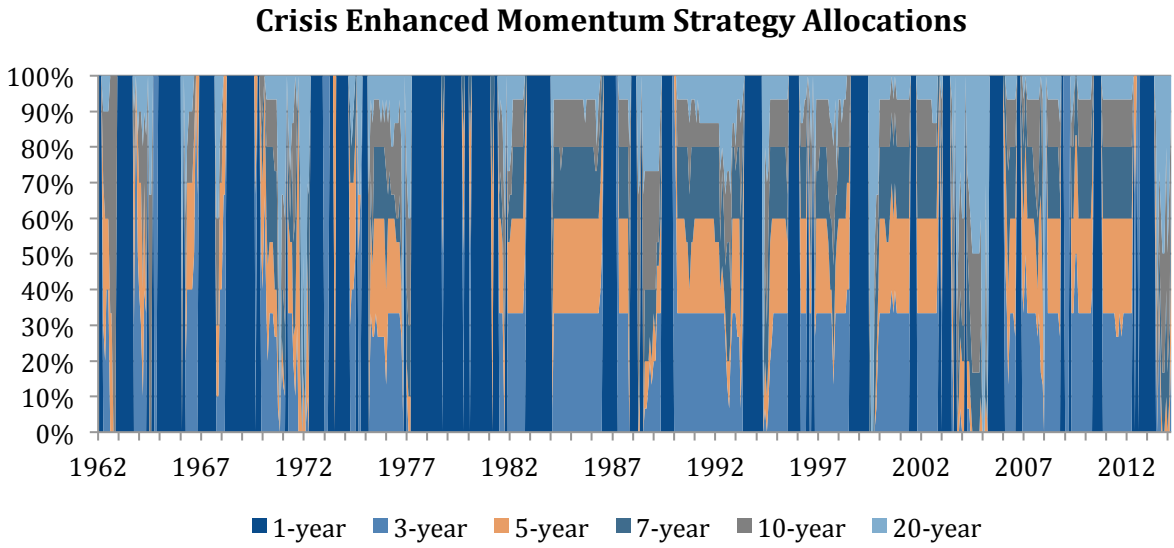
Asset	Relative Risk Aversion	Risk Aversion Rank	Allocation
A	10	3	50% (=3/6)
B	6	2	33% (=2/6)
C	2.5	1	17% (=1/6)

Focusing on ranks also has the effect of reducing the turnover of the portfolio by requiring larger shifts in the momentum indicators before an allocation change is made.

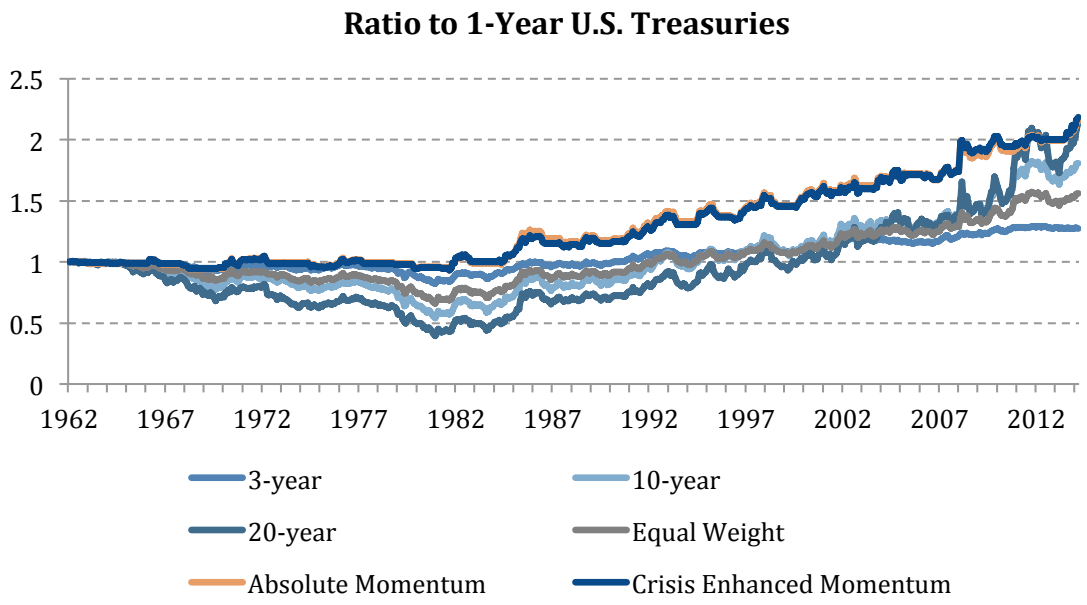
[9] For simplicity, we use the standard statistical measure of variance, $V(X) = E((X-\mu)^2)$. Further adjustments to this metric could be made, e.g. exponential weighting.

Constructing the Crisis Enhanced Portfolio

The Crisis Enhanced Momentum portfolio allocations are shown in the following chart:



The relative performance of the relative momentum portfolio over the whole time period is shown below ("Crisis Enhanced Momentum"). The growth of each of a set of constant maturity U.S. Treasury indices, along with the equal weight and absolute momentum portfolios, is shown for comparison.



From the chart, both the absolute momentum strategy and the relative momentum strategy appear to have similar performance. The table below shows the return/risk statistics for the various alternatives.

	1-year	3-year	5-year	10-year	20-year	Equal Weight	Absolute Momentum	Crisis Enhanced Momentum
Annualized Return	5.70%	6.19%	6.49%	6.90%	7.25%	6.60%	7.26%	7.29%
Annualized Volatility	1.84%	3.93%	5.59%	8.00%	10.35%	5.76%	5.42%	5.04%
Sharpe Ratio	-	0.12	0.14	0.15	0.15	0.16	0.29	0.32
Maximum Drawdown	1.61%	6.33%	10.76%	15.89%	23.13%	10.68%	7.19%	5.90%

While the absolute momentum and crisis enhanced momentum portfolio exhibited similar return characteristics over the time period, the Crisis Enhanced Momentum portfolio achieved those returns with less volatility and a lower drawdown.

Even though these two portfolios outperformed the 1-year U.S. Treasury index over the entire period, the performance we are after is crisis alpha. Using the two crisis measures discussed previously, we can calculate the performance of the portfolios over the crisis periods. We will evaluate the options on their respective crisis alpha, which is simply the excess return of the portfolio over 1-year U.S. Treasuries, and the efficiency, which is a measure of how much alpha is obtained for the incremental risk. For the i^{th} investment, the efficiency is defined as:

$$efficiency_i = \frac{\alpha_{crisis}}{\sigma_i - \sigma_{1-year\ U.S.Treasuries}}$$

		3-yr	5-yr	10-yr	20-yr	Equal Weight	Absolute Momentum	Crisis Enhanced Momentum
Crisis Measure 1 (drawdown)	Crisis Alpha	0.52%	0.52%	-0.23%	-2.97%	-0.25%	1.47%	1.65%
	Efficiency	0.21	0.12	-0.03	-0.28	-0.05	0.36	0.44
Crisis Measure 2 (>5% loss)	Crisis Alpha	0.72%	1.42%	1.22%	1.55%	1.20%	5.47%	5.03%
	Efficiency	0.29	0.31	0.14	0.12	0.23	0.90	0.89

Both the absolute momentum and Crisis Enhanced Momentum strategies exhibit significant crisis alpha under both measures. The Crisis Enhanced Momentum strategy has a higher efficiency under Crisis Measure 1.

An interesting note is that 20-year Treasuries exhibited negative crisis alpha under Crisis Measure 1 despite the current desirability of these assets during flights to safety. This is mainly attributable to the crises in 1969-70, 1973-74, and 1981-82 when the yield curve was inverted.

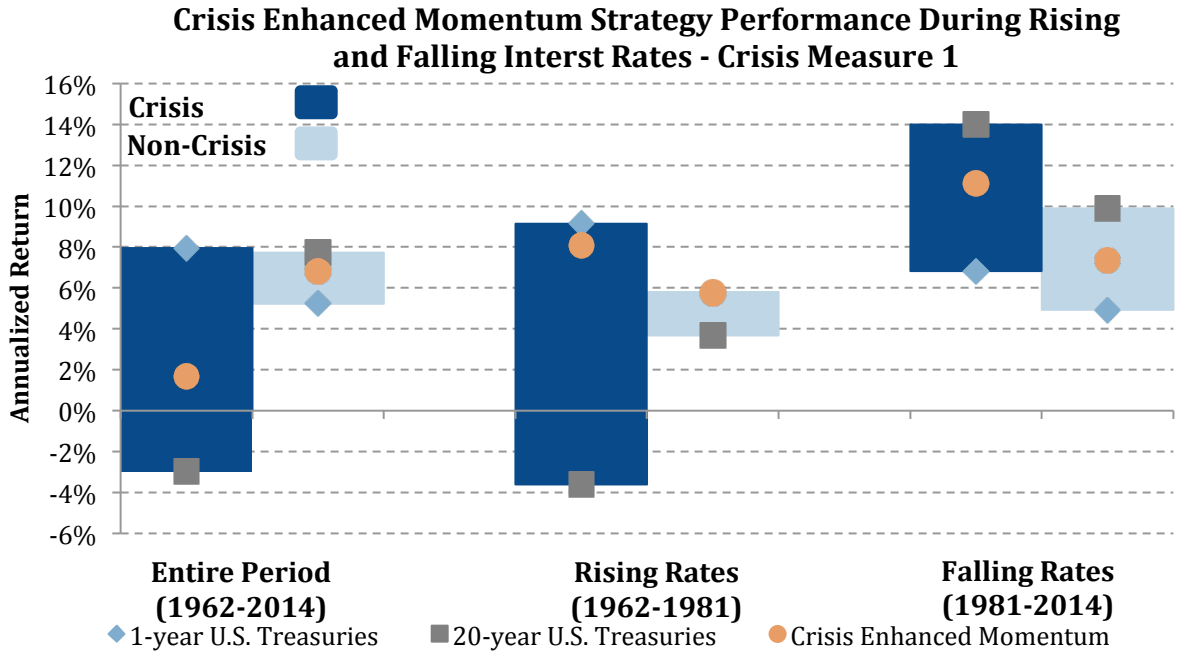
The Effect of Interest Rates

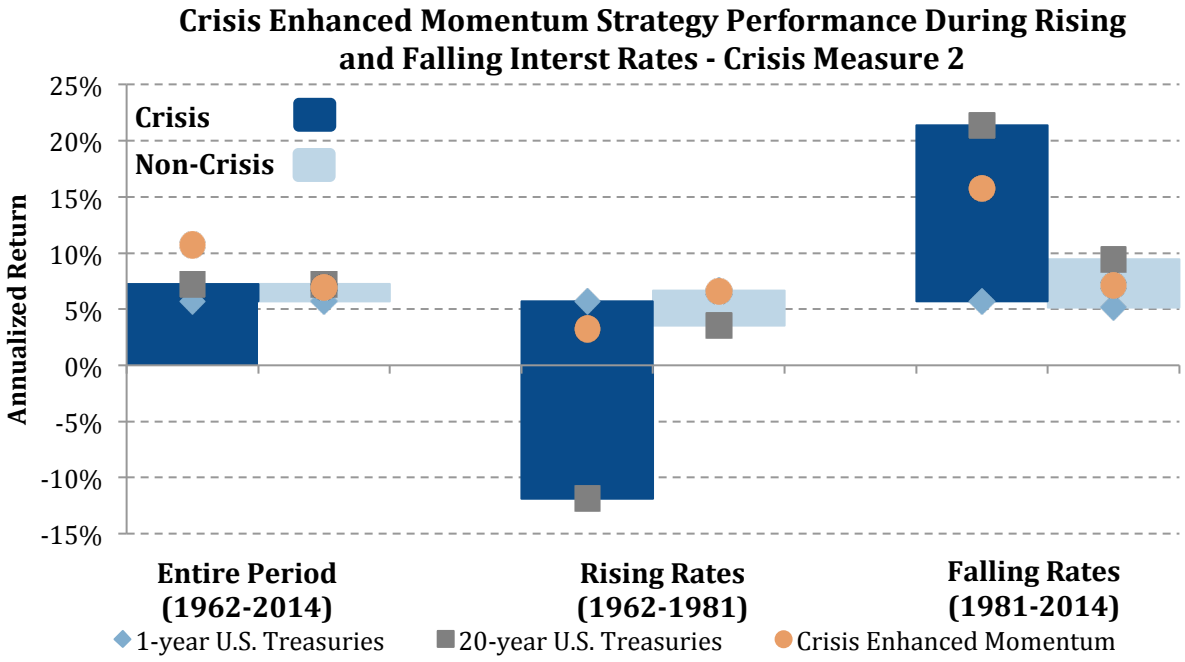
The strong bull market in fixed income over the past 30 years has been a boon to investor portfolios in times of market crisis. Since our strategy is intended for use during market crises, it is desirable for our methodology to add value regardless of the interest rate environment; we are seeking crisis alpha, not merely a fixed income portfolio propped up by falling rates.

During times of crisis in the equities market, rates often fall as demand drives them down in the flight-to-safety. However, we can divide our test period into two broad interest rate regimes to more closely examine the strategy's performance: Rising Rates (1962-1981) and Falling Rates (1982-2014). The charts on the following page show the return of the Crisis Enhanced Momentum strategy during these two regimes relative to the returns on the static allocations to 1-year and 20-year U.S. Treasuries, which were alternately the best and worst performing static allocations during rising and falling interest rate environments.

In both rising and falling interest rate regimes, the Crisis Enhanced Momentum strategy exhibited returns closer to the better performing static allocation, especially during crisis periods. Additionally, the charts show how the spread between the static allocations was much wider during crisis periods compared to non-crisis periods. This indicates that maneuvering along the

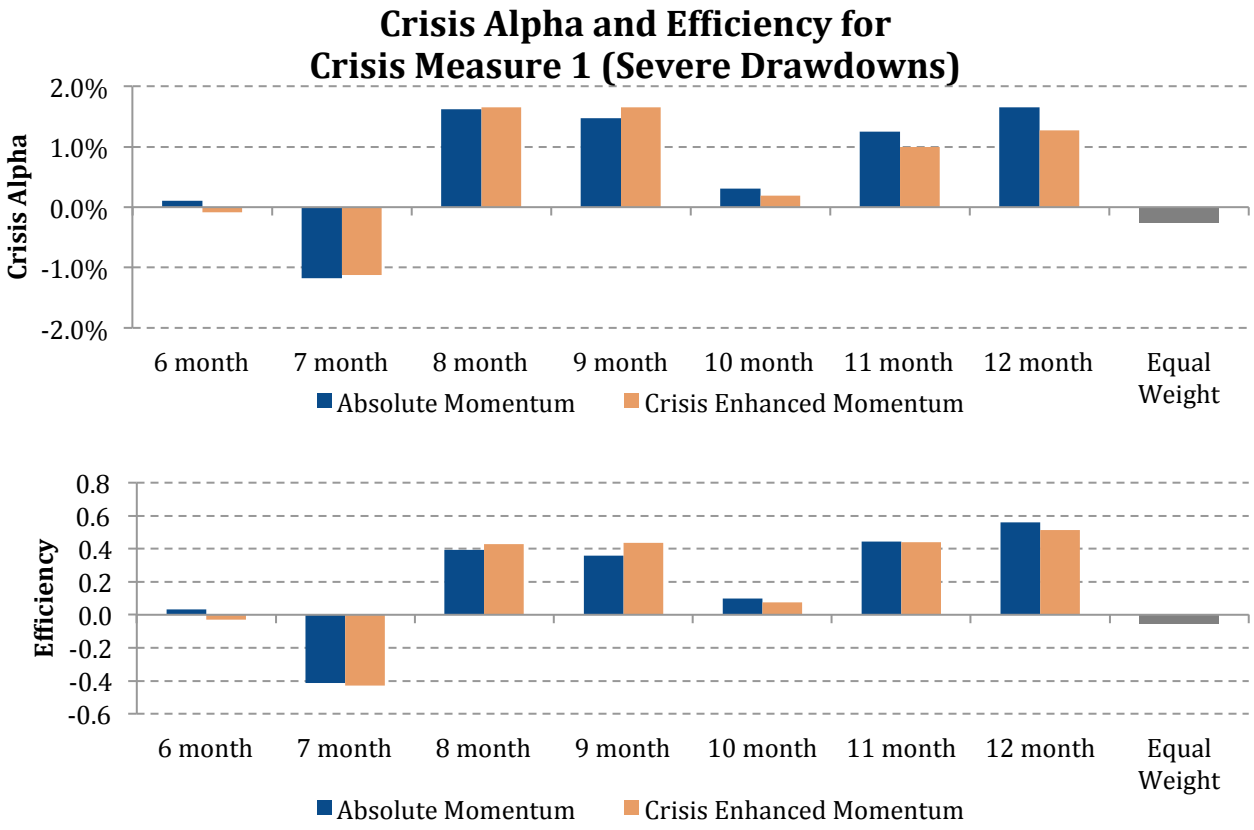
duration spectrum has the potential to add more value during a crisis. These graphs also illustrate how damaging it can be to move to long-dated Treasuries as a default safety net in the case of rising rates.



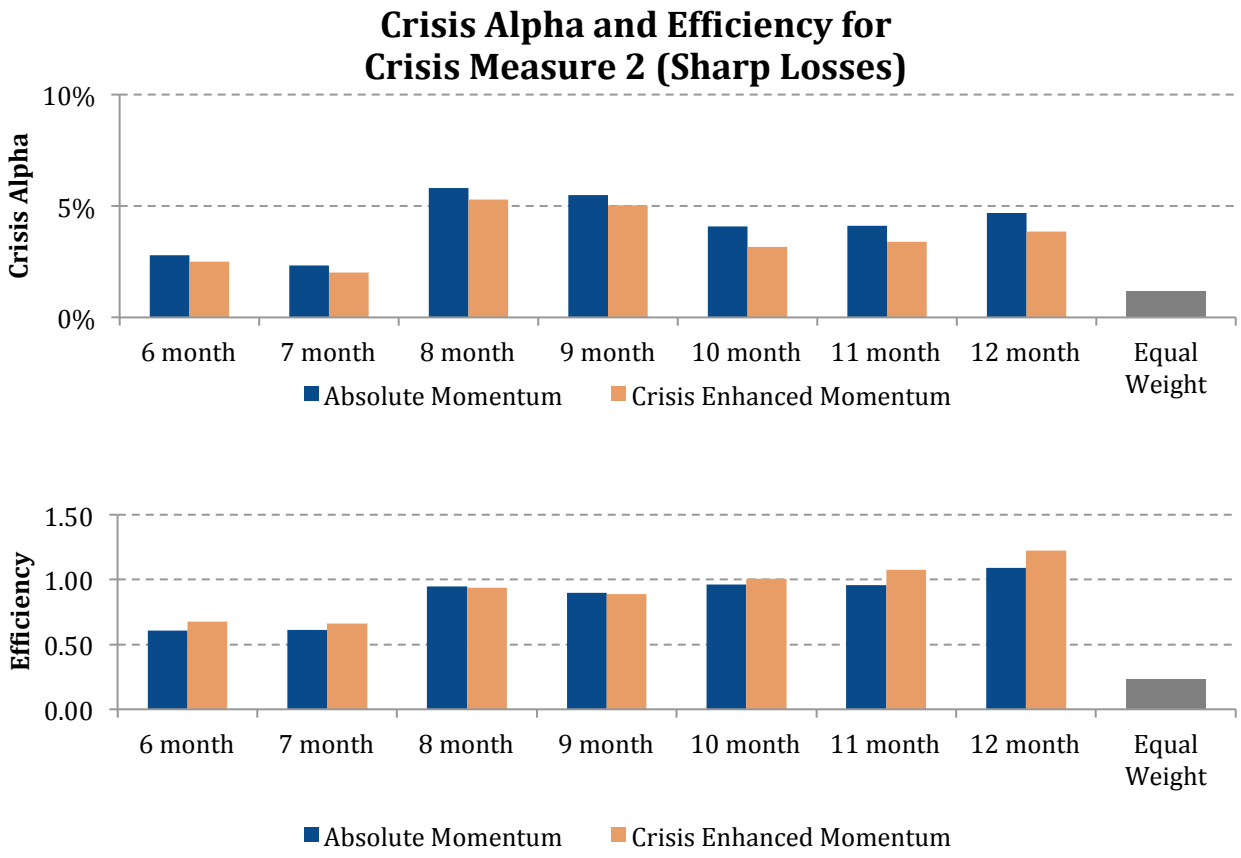


Evaluating Parameter Sensitivity

The lookback period for gauging momentum is the primary parameter in the model. The following graphs show the crisis alpha and efficiency for lookback windows ranging from 6 to 12 months under both crisis measures.[10]



[10] The negative crisis alpha for the 7 month window was mainly attributable to whipsaw events in the 1973-74 crisis and one in the 2008 Financial Crisis. It is a good reminder of one of the primary risks in momentum investing. A method of addressing this will be discussed in the section on practical implementation.



Over the study period, the crisis alpha captured by the Crisis Enhanced Momentum strategy is always positive and relatively robust to lookback window under Crisis Measure 2. Under Crisis Measure 1, the strategy exhibits reduced performance for lookback periods of 6, 7, and 10 months. Because the crisis alpha of the strategy closely tracks that of the absolute momentum strategy, these periods of reduced performance are attributable to whipsaw from the absolute momentum.

In many of the lookback windows under both measures, the absolute momentum strategy generates more crisis alpha. However, the Crisis Enhanced

Momentum strategy generates its crisis alpha more efficiently (i.e. with less risk). Furthermore, over the entire period from 1962-2014, the volatility of the Crisis Enhanced Momentum strategy was lower than that of the absolute momentum strategy for every lookback window by an average of 42 bps (approximately a 10% reduction). Having lower volatility with a similar return profile in periods not captured by our ex-post crisis measures can be beneficial in actual implementation where decisions are necessarily made ex-ante.

Detecting a Crisis

Capturing crisis alpha using tactical methods requires two steps:

1. We must identify an investment that has historically earned a premium during market crises.
2. We must decide when to invest in that asset, i.e. we have to believe that a market crisis is imminent.

We have laid out a method of generating crisis alpha using relative momentum in U.S. Treasuries, satisfying the first step. The second step is necessarily more dependent on the specific investment strategy of the overall tactical portfolio, e.g. sector rotation, global allocation, alternative income, etc. A crisis signal in a solely U.S.-based equity strategy may be different than a crisis signal in a strategy that has the ability to invest in, for instance, corporate bonds,

emerging markets, and commodities, in which case, the crisis alpha portfolio might also change.

The ideal scenario is to have a leading indicator of a crisis so that plans can be enacted to capture crisis alpha. The International Monetary Fund (2010) has conducted research into this type of early warning system by looking at a variety of macroeconomic indicators such as housing prices, GDP ratios, inflation, and P/E ratios. Babecký et. al. (2012) looked at similar macro economic indicators to predict crises in a Bayesian framework reduce model risk.

However, many tactical asset managers rely on rules-based, quantitative methods to construct their portfolios, rather than forecasting broad economic parameters. A recent paper by Faber (2013) presents a strategy for tactically allocating to cash to protect capital during periods of increased market risk. We substitute our Crisis Enhanced Momentum strategy in for cash in this strategy to capture crisis alpha.

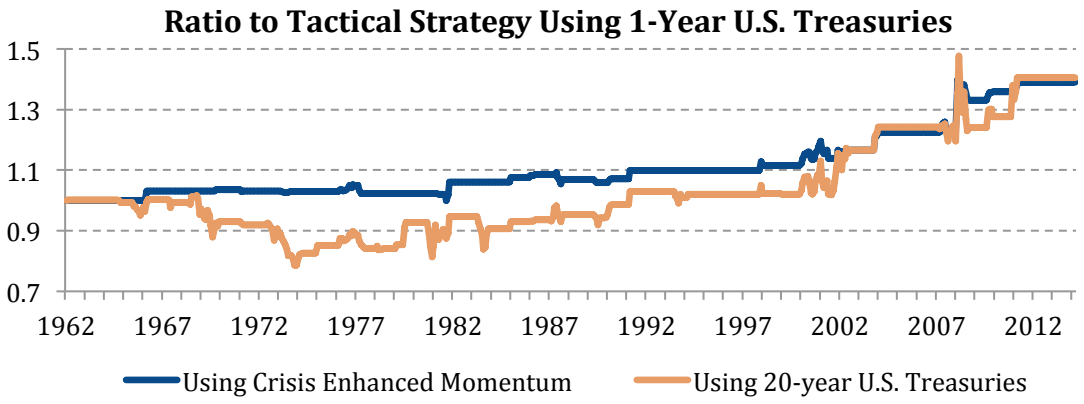
Case Study: Tactical Asset Allocation

In his popular paper, Faber (2013) proposed a strategy for investing in the S&P 500 Index during periods of positive momentum and cash when capital is perceived to be at an increased risk of loss. Each month from 1962-2014, if

the price of the S&P 500 Index is above its 10-month simple moving average (SMA), the portfolio invests in the S&P 500 Index; if the price is below the 10-month SMA, the portfolio holds cash. Comparing this ex-ante measure with the two ex-post measures of crisis, we see that it does a decent job at predicting crises, especially severe, and possibly prolonged, drawdowns.

	Crisis Measure 1 (severe drawdown)	Crisis Measure 2 (5% loss)
Crisis Months	108	57
Non-Crisis Months	519	570
Correct Crisis Calls	82%	63%
False-Positive Crisis Calls	20%	28%

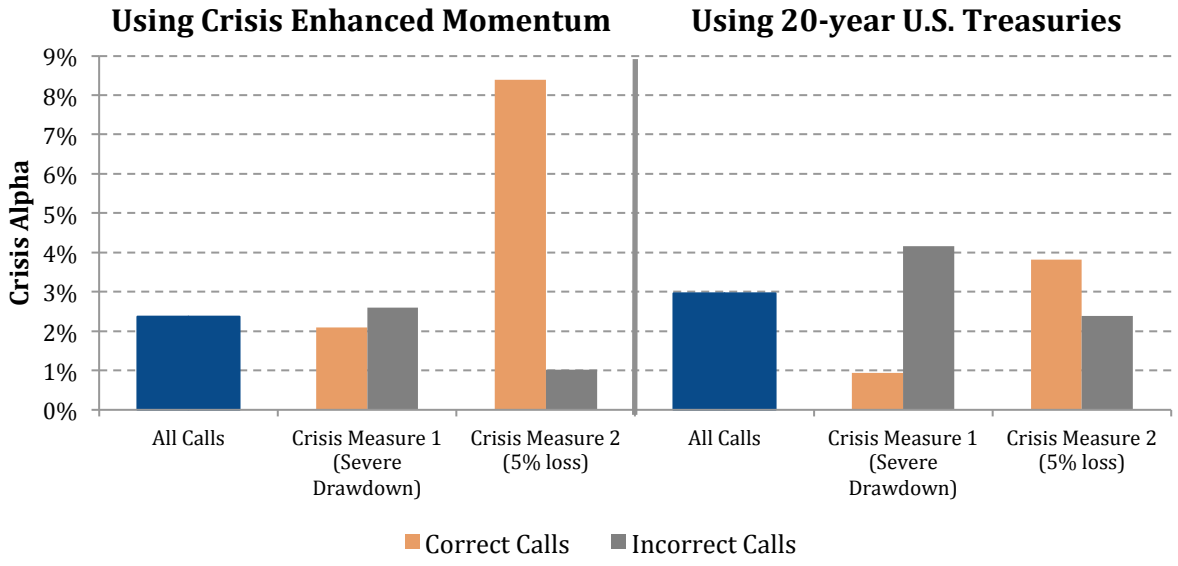
The performance metrics of the base strategy with 1-year U.S. Treasuries and with Crisis Enhanced Momentum and 20-year Treasuries are shown below:



	Using 1-year U.S. Treasuries	Using 20-year U.S. Treasuries	Using Crisis Enhanced Momentum
Total Return	8,866%	12,452%	12,317%
Annualized Return	8.98%	9.69%	9.67%
Annualized Volatility	10.61%	12.16%	10.92%
Sharpe Ratio	0.15	0.19	0.21
Maximum Drawdown	24.02%	23.65%	25.28%

The Crisis Enhanced Momentum strategy added 69 bps to the annualized return with only a marginal increase in volatility compared to the base strategy. Over the test period, this results in a significant increase in the total return. The strategy with 20-year U.S. Treasuries exhibited higher volatility with no improvement in return. It also lagged the base strategy during much of the 1970s when the yield curve was often inverted during crises.

We can further decompose the crisis period performance utilizing our two ex-post crisis measures to gain some insight on what types of crises this tactical measure captures most accurately.



From the chart, we see that both the Crisis Enhanced Momentum strategy and 20-year U.S. Treasuries added increased returns during the "crises" predicted by the tactical model. However, the Crisis Enhanced Momentum strategy added

more crisis alpha when the model made the correct calls based on the ex-post crisis measures. Much of the benefit of 20-year U.S. Treasuries was attributable to the model's wrong calls paired with the strong bull market in long dated treasuries over much of the period.

We also see that, under both measures, incorrect calls – false positives – in the model still added value. While these periods were not classified as crises in either of the ex-post measures, the crisis enhanced momentum strategy still outperformed 1-year U.S. Treasuries on average; prevailing tailwinds in fixed-income made the cost of being wrong less taxing.

A Real World Implementation

Up to this point, we have focused on indices, largely due to the availability of historical data. With a wide array of liquid U.S. Treasury ETFs, the Crisis Enhanced Momentum strategy is easily implementable. Mirroring the strategy construction presented thus far and the crisis detection measure outlined in the case study, the following table shows that it has generated crisis alpha over the period from 2003-2014.[11] "Crisis months" are those where the tactical model holds cash; "True positive crisis months" are those where the model was in cash and SPY had a negative return; and "False positive crisis

[11] The excess turnover of the Crisis Enhance Momentum Strategy relative to a static allocation was 134% annualized.

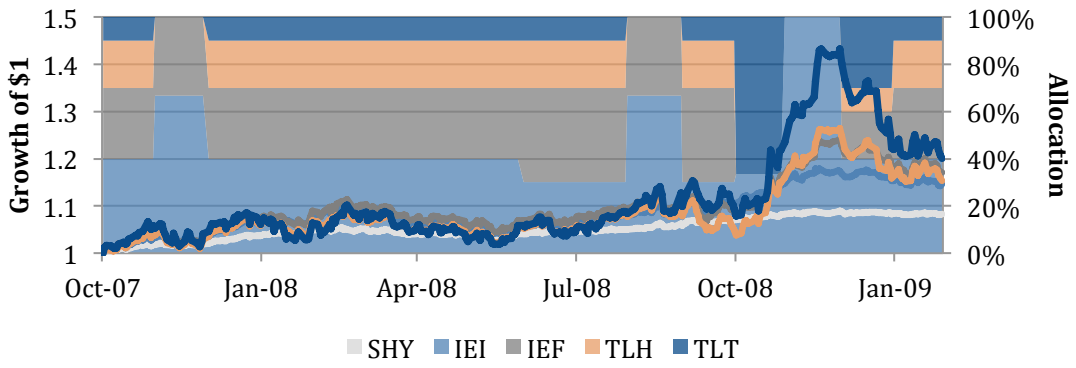
months" are those where the model was in cash and SPY had a positive return.[12]

		SHY (1-3 year)	TLT (20+ year)	Crisis Enhanced Momentum
Crisis Months	Annualized Return	3.02%	8.86%	6.34%
	Annualized Volatility	1.89%	20.16%	9.84%
	Sharpe Ratio	-	0.29	0.34
True Positive Crisis Months	Annualized Return	5.54%	18.68%	13.27%
	Annualized Volatility	2.16%	23.06%	12.38%
	Sharpe Ratio	-	0.57	0.62
False Positive Crisis Months	Annualized Return	0.55%	-0.14%	-0.17%
	Annualized Volatility	1.30%	17.36%	6.42%

This period included only one major crisis, the 2008 Financial Crisis, during which long-dated U.S. Treasuries exhibited stellar performance due to falling interest rates. Thus, a static allocation to long-dated Treasuries generally did well but added volatility at a time when investors are more risk averse. The Crisis Enhanced Momentum Strategy not only generated crisis alpha relative to holding SHY but also significantly reduced the volatility when the model made false positive calls.

We can explore the allocations during the crisis (Oct 2007 – Feb 2009) to examine how relative momentum was still able to generate crisis alpha.

[12] Even though the tactical model does not attempt to miss every down month in the S&P 500, distinguishing between months in this way allows us to evaluate the tradeoff of whipsaw costs and crisis alpha.



The strategy held relatively static allocations during the first part of the crisis as none of the Treasury maturities exhibited particularly strong relative momentum. As TLH lost ground relative to the pack in the Fall of 2008, the allocation to TLT increased. Long-dated treasuries had a dramatic run-up into 2009, but with these gains came increased volatility, which moved the portfolio back along duration spectrum to IEI. Prices leveled off momentarily, bringing TLT and TLH back into the portfolio. This coincided with a rate spike in January 2009, after which, the model reduced the average duration of the portfolio.

Many model risks in an actual implementation can be mitigated with thoughtful design. For instance, volatility can be calculated using daily data and timing risk can be reduced using *portfolio tranching*.[13] One example where this could be helpful is in January 2009 when long-term rates climbed, causing TLT to lose 14% when investors were already reeling from the Financial Crisis.

[13] Portfolio tranching is a method of running the model each day and averaging over the past month to increase the adaptability of the portfolio to the market environment while reducing whipsaw without necessarily increasing turnover.

As we saw in a previous section, the performance of the Crisis Enhanced Momentum strategy relative to a given static allocation, either long or short duration, is influenced by the interest rate environment. Rates generally fell during the period from 2003-2014, providing strong tailwinds for long-dated Treasuries. Despite this, the Crisis Enhanced Momentum strategy was able to add crisis alpha, and with rates currently low and poised to rise, static positions in long-dated Treasuries may not continue to outperform in subsequent crises. While market environments rarely ever exactly repeat, the evidence from 1962-1981 showed that the strategy was able to thrive in a rising rate environment by adapting to market conditions and sliding down the duration spectrum when prudent.

Conclusion

While fully tactical "go-to-cash" strategies have become popular in the market over the past few years, it may be possible to "go-to-something-better-than-cash" to generate crisis alpha in equity portfolios.

In this paper, we introduced a method of constructing a crisis alpha focused portfolio using absolute and relative momentum in U.S. Treasuries. We defined two different ex-post crisis measures and showed that over the backtest period from 1962-2014 using constant maturity U.S. Treasury indices,

the Crisis Enhanced Momentum portfolio was able to generate crisis alpha under both measures, taking the default alternative to be the 1-year U.S. Treasury index. Using 9-month risk-adjusted momentum, the portfolio outperformed each asset individually and an equal weight portfolio on both an absolute and risk-adjusted basis. It was also generally superior to an absolute momentum portfolio based on these metrics.

We analyzed the performance of the strategy over periods of rising and falling interest rates and found that the strategy was able to efficiently move along the duration spectrum to capture crisis alpha during both rate environments. We also examined the sensitivity of the strategy to the lookback window length and showed that the proposed portfolio produced more crisis alpha than an equal weight portfolio over nearly every lookback period. The strategy also exhibited strong risk-adjusted performance over the entire backtest period, providing leeway for outperformance during non-crisis times.

We then considered how this portfolio could be leveraged to generate crisis alpha in an existing tactical equity strategy. Rather than maintaining a static allocation to the Crisis Enhanced Momentum strategy, as is typically done with other sources of crisis alpha such as managed futures, we looked at a possible method of detecting a crisis ex-ante, in which case the Crisis Enhanced Momentum strategy can be used as a safety asset in place of cash. We showed

that this significantly increased the portfolio return, even if the ex-ante crisis detection method did not fully agree with the ex-post crisis measures.

Finally, we presented an investable version of the strategy using liquid fixed income ETFs. We discussed some practical improvements that could be made to reduce model risk and whipsaw.

Having an accurate model to predict market crises and de-risk a portfolio is the Holy Grail of tactical asset management; avoiding major losses is a main contributor to long-term performance. However, models can fail, and it is prudent to have a backup. Pairing a tactical model with a source of crisis alpha such as the Crisis Enhanced Momentum strategy can lead to improved performance, not only during market crises but also during times when the crisis prediction model may fail.

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